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<p>(51) International Patent Classification ⁶ : B65D 19/34, 19/40</p>	<p>A1</p>	<p>(11) International Publication Number: WO 98/18686</p> <p>(43) International Publication Date: 7 May 1998 (07.05.98)</p>
<p>(21) International Application Number: PCT/SE97/01767</p> <p>(22) International Filing Date: 23 October 1997 (23.10.97)</p> <p>(30) Priority Data: 9603905-2 25 October 1996 (25.10.96) SE</p> <p>(71) Applicant (for all designated States except US): DALWELL AB [SE/SE]; P.O. Box 51, S-668 02 Bäckefors (SE).</p> <p>(72) Inventor; and (75) Inventor/Applicant (for US only): HAUGAN, Olav [NO/NO]; N-3510 Sokna (NO).</p> <p>(74) Agent: SIEBMANN, H.; Gotapatent AB, P.O. Box 154, S-561 22 Huskvarna (SE).</p>		<p>(81) Designated States: AL, AM, AT, AU, AZ, BA, BB, BG, BR, BY, CA, CH, CN, CU, CZ, DE, DK, EE, ES, FI, GB, GE, HU, ID, IL, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MD, MG, MK, MN, MW, MX, NO, NZ, PL, PT, RO, RU, SD, SE, SG, SI, SK, TJ, TM, TR, TT, UA, UG, US, UZ, VN, ARIPO patent (GH, KE, LS, MW, SD, SZ, UG, ZW), Eurasian patent (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, NE, SN, TD, TG).</p> <p>Published With international search report. In English translation (filed in Swedish).</p>
<p>(54) Title: A PALLET AND A PALLET LEG RESPECTIVELY AS WELL AS A METHOD OF PRODUCING SUCH A PALLET AND PALLET LEG RESPECTIVELY</p> <div data-bbox="650 1573 1517 2213"></div> <p>(57) Abstract</p> <p>A pallet leg (1) and a pallet respectively comprises and is provided with respectively as legs a punched and grooved and/or perforated blank, made of corrugated paper-board having a transversal wave direction. The blank is folded up in a supporting and bracing way. According to the invention brace legs (9) extend from the against each other abutting areas of the top surfaces (7) of a leg (1), obliquely downwards and into the corner area between a base surface (2) and a wall (5), in a hypotenuse-like, a pressure arch-forming way, to which brace legs in a flat position against the inner side of the flanks (5) with an inherent elasticity, due to the structural design, abutting support legs are connected. In order to maintain the folded-up application condition of the leg and the fixing of said pressure arch the top surfaces (7) are designed to be fastened to the bottom surface of an upper pallet tray (26), which jointly with an arbitrary number of legs constitutes a complete pallet (25).</p>		

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A PALLET AND A PALLET LEG RESPECTIVELY AS WELL AS A METHOD
OF PRODUCING SUCH A PALLET AND PALLET LEG RESPECTIVELY

The present invention relates to a pallet and a pallet leg respectively of the type described in the preamble of patent claim 1. The invention also relates to a method of producing a pallet and a pallet leg according to the preamble of the first method claim.

A preferred field of application for pallets and pallet legs according to the invention is disposable pallets, particularly made of corrugated paper-board.

US-A-5 372 074 relates to a pallet made of pasteboard or cardboard. This pallet is provided with legs having a trapezoidal shape in cross-section, which on their upper and lower sides and the two outer sides of the outer legs, in order to stiffen the pallet, are glued to an upper and a lower pallet tray respectively. Special embodiments according to Figs. 6 and 9 are, straight across the pallet, provided with openings 630 and 930 respectively, designed to receive forks on a fork lift. These openings have been obtained by mounting in the longitudinal direction short leg portions between the pallet trays and by providing the flaps of the latter, folded down along the pallet sides, with punchings, which correspond to said openings, at least in the longitudinal direction of the legs. Said constructions appear to be disadvantageous in several respects. Firstly, it is time, material, and equipment consuming to produce a pallet, which according to Fig. 5 comprises as many as 14 separate components. All these components must be brought into and then retained in exact positions during the manufacture and they must also, during the use of the pallet, be kept in their positions. Otherwise the pallet will collapse. Secondly, the obtained product is a pallet, the upper tray of which and consequently the load only is supported in certain points. Thirdly, such a pallet can not be stacked in a space-saving way by turning each pair of pallets with their leg sides towards each other and pushing them into each other with a certain mutual lateral displace-

ment. Fourthly, there is no satisfactory interaction between the leg openings and a fork on a fork lift, i.e. no protection of the openings against unintentional damage and no satisfactory load distribution, and fifthly, considerable unevenesses on e.g. a storage floor between the leg portions affect the latter and consequently also the eveness of the upper pallet tray. Last but not least it is not possible to mount the legs and the pallets respectively in an advantageous, quick and simple way and to obtain the correct shape of the openings with simple means and to obtain additional reinforcements within the area of the openings.

DE-A-2 215 204 relates to a pallet, produced by folding a plurality of corrugated paper-board blanks. The pallet sides, which will function together, have in a horizontal plane flap sections, which can be swung away by means of an inserted fork on a fork lift. These do not affect the area above the fork on the fork lift with pressure distribution and will probably, at least when the pallet is loaded, not return to their original positions.

Also, these and other known leg and pallet designs respectively are disadvantageous, since the legs are not sufficiently braced and consequently are weak and instable respectively. Tilting and/or lateral sliding as well as parallelogram-like cross-section or profile changes are possible during loading and if the legs have been fastened in a defective way. Finally, moisture may often penetrate into the legs from their ends and weaken the legs and render repeated use impossible, in case such a use is desirable.

One object of the present invention is to counter-act and eliminate as much as possible the above-mentioned drawbacks. Another object of the invention is to in various additional respects develop the state of the art in this field. The invention in particular is to offer an in a total way more reasonable solution of the present problems; the pallet and the leg volume and weight respectively are to be minimal; the stacking/storage is to, if possible, be avoided and alterna-

tives be offered; a quick and advantageous adjustment to a continuous production and different products and product sizes is to be done ; sanitary requirements are to be met; waste is to be avoided ; and reuse is to be made possible; automatic production/mounting is to be done with minimal requirements as to machine equipment ; the strength of the entire pallet or parts of it, particularly the legs and an upper pallet tray are to be made variable according to the requirements and the desires ; and improved opportunities to integration and advertisements/informations are to be obtained. Strength reduction in legs and pallets respectively due to moisture penetration is to be prevented and reduced to a minimum respectively and advantageous combination possibilities are to be attained by means of an increased product strength, simplified work operations and far-reaching constancy of the product shape. Finally, the leg construction is to render possible a complete or far-reaching independent locking of the leg portions in relation to each other.

These objects are attained by designing a pallet of the type described in the introduction mainly in the way set forth in the characterizing clause of patent claim 1. Said objects are also attained by carrying out the method described in the introduction mainly in the way set forth in the first method claim.

Additional characterizing features and advantages of the invention are set forth in the description, reference being made to the enclosed drawings, which partly in a schematic way illustrate a few non-limiting embodiments of the invention and which in more detail show :

Fig. 1 is a perspective view from above of a preferred leg embodiment according to the invention, in which the material around an opening for an insertion of a fork on a fork lift is being folded , whereas the material around another such opening already has been folded ;

Fig. 2 a perspective view from below of the leg according to Fig. 1 ;

Fig. 3 shows a finished plane blank, cut and grooved, for a

leg according to Fig. 1 or the like ;

Fig. 4 is a perspective view from above of a modified leg design, which corresponds to a leg shown in Figs. 1 and 2 but without openings ;

Fig. 5 is a finished plane blank , cut and grooved or the like, for a leg according to Fig. 4 ;

Fig. 6 is a perspective view from above of a pallet design with legs according to Fig. 1 ;

Fig. 7 a perspective view from above of a pallet design with legs according to Fig. 4 ; and

Fig. 8 a perspective view from above of a schematically illustrated production line for pallets according to the invention.

According to the drawings a rectangular, mirror-symmetrical pallet leg blank, according to the present invention is made of an e.g. corrugated paper-board having a wave direction, which preferably is transversal to the longitudinal direction of the leg. The leg can be oblong and is provided with two central longitudinal grooves or other bending notches 3, the distance between which corresponds to the desired width of leg base 2. On opposite sides of said grooves or the like there are at a corresponding or possibly somewhat larger distance grooves 4 , designed to define leg walls 5, then at a somewhat smaller distance grooves 8 follow, defining top surfaces 7, grooves or the like 10 being provided to define hypotenuse-like downwardly oblique brace legs 9 in a pressure arch-forming way, which are connected to free support legs 11 having free longitudinal edges 12. In order to give the pressure arch an optimal bearing capacity and in order to render difficult or impossible a parallelogram-like torsion of the leg profile the angle between a brace leg 9 and leg foot 2 is to be less than 80° , preferably $60-75^{\circ}$. In this way a square or standing outer profile for a leg is obtained and the above-mentioned characteristics are secured. The support legs contact wall 5 in a plane on their inner side and are pressed against this side due to the diagonal direction of the brace legs and consequently an efficient locking in the corner between the walls and the leg base is obtained. In or-

der to retain the folded application condition of the leg and then also the fixing of said pressure arch usually it is sufficient, that top surfaces 7 are fastened to an upper pallet 26, which jointly with an arbitrary number of legs 1 constitutes a complete pallet 25. Of course, it is also possible to wind one or several layers of paper, paper-board, corrugated paper-board or a plastic material around a leg, the ends of the leg possibly being closed, before the leg is fastened to a pallet leg. Also or alternatively, it is possible to slip and possibly paste shape-complementary lids (not shown) on the leg ends, a lid border or collar covering a portion of the respective leg end.

The leg blank is provided at its end edges with glued sealing tape 6, which protects the open material, e.g. corrugated paper-board, against moisture penetration. The blank can be provided, when it is still a fed material web, with such tape around its edges or it is possible to fasten the tape after the cutting of the web into sheets designed to become leg blanks. In this latter connection reference is made to Fig. 5, in which a leg blank 1 for a leg 1 without openings 13 is shown. The corners are provided with indentations 22 and the blanks are designed to be fed close to each other, the end edges 12 of adjacent blanks touching each other or being positioned very close to each other. In this way mirror-symmetrical indentations are obtained, seen in a direction transversal to the legs, which have a double width, which is sufficient to allow a knife or the like (not shown) to cut in halves a continuous tape strip 6, which consequently is applied in an earlier stage, possibly on a continuous material web, from which the blanks subsequently are formed through punching, grooving or the like and cutting etc. The fed tape strip can also provide a certain keeping-together and/or other guiding capacity, e.g. relatively high feeding speeds being allowed in this way. In order to push and pull respectively the blanks through at least a portion of a production and application line respectively e.g. U-shaped recesses 24 in end edges 12 and holes 23 respectively in support leg areas 11 can be provided.

The leg is, in its longitudinal direction in positions at a distance from each other in support legs 11, provided with rectangular openings 13, which are through in a transversal direction. The mutual distance between the openings corresponds to the distance between the fork legs (not shown) on a fork lift (not shown). In the leg blank openings 13 are along their lateral edges provided with protection flaps 14, which preferably have roughly the same width as top surfaces 7. It is shown in the drawings, that within the area with these openings 13, brace legs 9 and top surfaces 7 are provided with substantially rectangular openings 15, the size of which, like the size of openings 13 including protection flaps 14, corresponds to the size of openings 13 in the finished folded leg. Openings 15 can also solely be provided in brace legs 9 and leave top surfaces 7 untouched, in which case openings 13 in the finished folded leg are not open upwards but shielded by accordingly through top surfaces, which in their entirety are fastened, e.g. glued, below a pallet tray of known design (not shown). Legs 5 are in the area with openings 13 provided with flaps 16, which are connected to the leg blank along longitudinal side 18, which faces wall base or leg base 2 and is swingable around perforations, grooves or the like, which constitute this longitudinal side. The corners of the flaps are provided with indentations 17, which facilitate and render possible respectively a folding process, described in the following. These flaps are allowed to extend into the area for top surfaces 7, the extension of the flaps in this way increasing in the transversal direction of the legs. In a particular case it may be sufficient to use the flaps 16 on just one side, a mirror-symmetrical blank in the longitudinal direction of the leg consequently being obtained.

The folding is carried out in the following way : Support legs 11 are folded towards adjacent brace leg 9, until the angle between them according to Fig. 1 is obtained or an even smaller angle or the two legs abut each other. Subsequently the outer portions, prepared in this way and each comprising a support leg and a brace leg, are folded towards each other,

until the useful shape , shown in Fig. 1, has been obtained. In this situation the leg can be fastened, e.g. glued , with the top surfaces below a pallet tray. The useful shape is retained without any additional means, since the brace legs extend diagonally from the upper center of the leg to the lower corners and would require more space to be able to unintentionally return to another position. Consequently, no such unintentional return is possible. Thanks to the inherent elasticity of the material the support legs are positioned in a flat position against the inner side of the respective wall. It is also possible to glue the walls and support legs together with the exception of the flap areas.

In a leg produced in this way it is possible to leave the flaps as a portion of the walls and the support legs respectively, which then will have a carrying and pressure distribution function. Not until a fork on a fork lift is pushed against flaps 16, will these flaps be folded inwards and pulled along the lateral protection flaps, which then close the lateral hollow space in the leg and reinforce the area around the opening in all respects. At the same time a locking is obtained through friction and/or a structuring, which e.g. involves the fact, that openings 15 within the area for brace legs 9 will be slightly wider, which means, that the protection flaps can be pushed aside in this somewhat widened lateral space. With this in view longitudinal edge 19, positioned opposite longitudinal edge 18, can have lateral oblique portions 20, obtained because central portion 21 extends into opening 15 as a short and wide tongue, to which said section is connected in a step-like way. Thanks to said recessed sections the protection flaps and the large flaps do not interfere with each other but lock each other in an advantageous way in the final position.

However, a more advantageous way to give the leg its final shape probably is, in connection with the folding of the leg blank to a leg or directly afterwards, to in each opening initially fold the flap inwards on one side, the protection flaps being brought along, and subsequently fold the flap on

the other side inwards, the protection flaps associated with this flap also being brought along, the latter inwardly folded flap of course being positioned on top of the first inwardly folded flap, which however is not a disadvantage but an advantage, because in this way a lower reinforcement in connection with the opening is obtained. All the flaps are retained and do not have to be glued or the like. Of course, e.g. the flaps positioned on top of each other can be glued together. If the main flaps are glued together, an efficient holding-together of the finished folded leg is obtained in this way, which can be transported and stored in this shape without risk that the joining will be undone.

The method of producing a pallet 25 according to the present invention preferably is integrated into a packaging and/or loading line. One embodiment is shown in Fig. 8. A tray 26 or a box or the like is fed and simultaneously leg blanks 1 are fed in a transversal direction and are folded into legs, which subsequently are fastened to the bottom surfaces of the tray or the like, e.g. by gluing and/or by staples, a finished pallet, a container provided with legs or the like being obtained. Fig. 8 also shows, that the leg blanks, fed from a pile of leg blanks, pass between two tape application areas 27, in which to each side of the blank a continuous tape strip is fastened, the one half of it to the upper side and the other half of it on the bottom side, after which the strip is cut between two blanks, fed after each other in the way described above in connection with Fig. 5. Thus, if an integration in such a line is done, the need to produce legs and pallets in different locations and to transport them to the line and store them etc. will be eliminated. Thus, quick adjustments to different leg and pallet designs or the like are easy to attain.

It may also be advantageous to provide leg base 2 on its bottom side and/or tray 26 on its top side with a coating, which enhances the friction or one or several strings, strips or the like having such properties. In this way a sliding of pallets on e.g. the platform of a driven truck and goods on the pal-

let tray is counter-acted, if said goods do not fill the tray completely or if the tray is not designed like a trough but as a completely flat surface.

Also, it is easy to handle used pallets, particularly if they are provided with e.g. longitudinal tear-off tapes in order to in a quick and simple way split the pallet into smaller units easy to handle.

The present invention is not limited to the embodiments described above and shown in the enclosed drawings but can be modified and supplemented in an arbitrary way within the scope of the inventive idea and according to the enclosed patent claims. Of course, in all places, where grooves have been described or shown, perforations or the like can also or alternatively be used.

CLAIMS

1. A pallet and a pallet leg (1) respectively for such a pallet, the legs being made of particularly corrugated paper-board by folding a blank in order to obtain a continuous base surface (2) and two top surfaces (7), adjacent each other as well as walls (5) joining said base surface and top surfaces, and also brace legs (9), designed to brace the legs and partially support a pallet load, c h a r a c t e r i z e d in that regarding the leg profile, from the areas of the top surfaces (7), which are positioned adjacent each other, said brace legs (9) extend obliquely downwards and backwards into the corner area between the base surface (2) and the respective wall (5) in a hypotenuse-like, a pressure arch-forming way, to which brace legs support legs (11) are connected, which support legs in a flat position abut against the inner side of the walls with an inherent elasticity due to its structure and completely cover said walls vertically, and in that in order to retain the folded-up application condition of the leg and fix said pressure arch said top surfaces (7) are designed to be fastened below an upper pallet tray, which jointly with an arbitrary number of legs constitutes a complete pallet.

2. A pallet or the like according to claim 1, c h a r a c - t e r i z e d in that its legs (1) comprise a rectangular and mirror-symmetrical blank made of corrugated paper-board, which preferably is oblong in the longitudinal direction of the designed leg, the wave direction of said corrugated paper-board being transversely directed in relation to the longitudinal extension of the legs, and in that said blank has two central longitudinal grooves or other folding notches (3), the mutual distance between which corresponds to the designed leg base width, that on both sides of said grooves or the like (3) , at a somewhat large distance, grooves (4), designed to mark off the leg walls (5), in connection with the last-mentioned grooves the top surfaces (7)

are provided, which are limited at a somewhat smaller distance by grooves (6), in connection with which the brace legs (9) are provided, which are marked off outwards by free brace legs (11).

3. A pallet or the like according to claims 1 or 2, characterized in that the walls (5) and the support legs (11) form within the area of transversally through openings (13) for the fork on a fork lift around vertical and horizontal respective lines foldable flaps (14 and 16 respectively) designed to, when the fork lift is inserted or in connection with the production and mounting respectively, be bent in a lateral direction and downwards respectively in order to in this way laterally limit every opening side and be put on top of each other respectively and in this way act to distribute the pressure and lock each other in the desired position.

4. A pallet or the like according to any of claims 1-3, characterized in that the brace legs (9) are designed to be fastened to each other, possibly solely in a selected area, e.g. at the top, through gluing and/or stapling or the like or by means of one or several layers of paper and/or a plastic material, applied around the leg in order to maintain the designed application position of the folded-up leg.

5. A pallet according to any of claims 1-4, characterized in that the blank for a leg (1), at positions, at a distance from each other in the longitudinal direction of the leg, is provided with mainly rectangular closed openings (15), which in a transversal direction each extends over a top surface (7) as well as portions of a wall (5) and a brace leg (9), and in that the support legs (11) are provided with substantially rectangular, in a transversal direction accessible openings (13), directly opposite the respective closed openings, which in a lateral direction are lined with protection flaps (14), which roughly have the same width as the top surfaces (7).

6. A pallet or the like according to any of claims 1-5, characterized in that the legs and the leg blanks (1) respectively at their end edges are provided with glued-on sealing tape (6) and/or glued-on shape-supplementary lids.

7. A pallet or the like according to claims 1-6, characterized in that the leg blanks (1), in order to be able to handle and guide them respectively, are provided with indentations (22) in the corners and/or with holes (23) in the support leg areas (11) and/or with recesses (24) in their end edges (12) and/or in that the pallet is provided with a preferably longitudinal tear tape in order to break up the pallet, when the use is over, into smaller, easily manageable units.

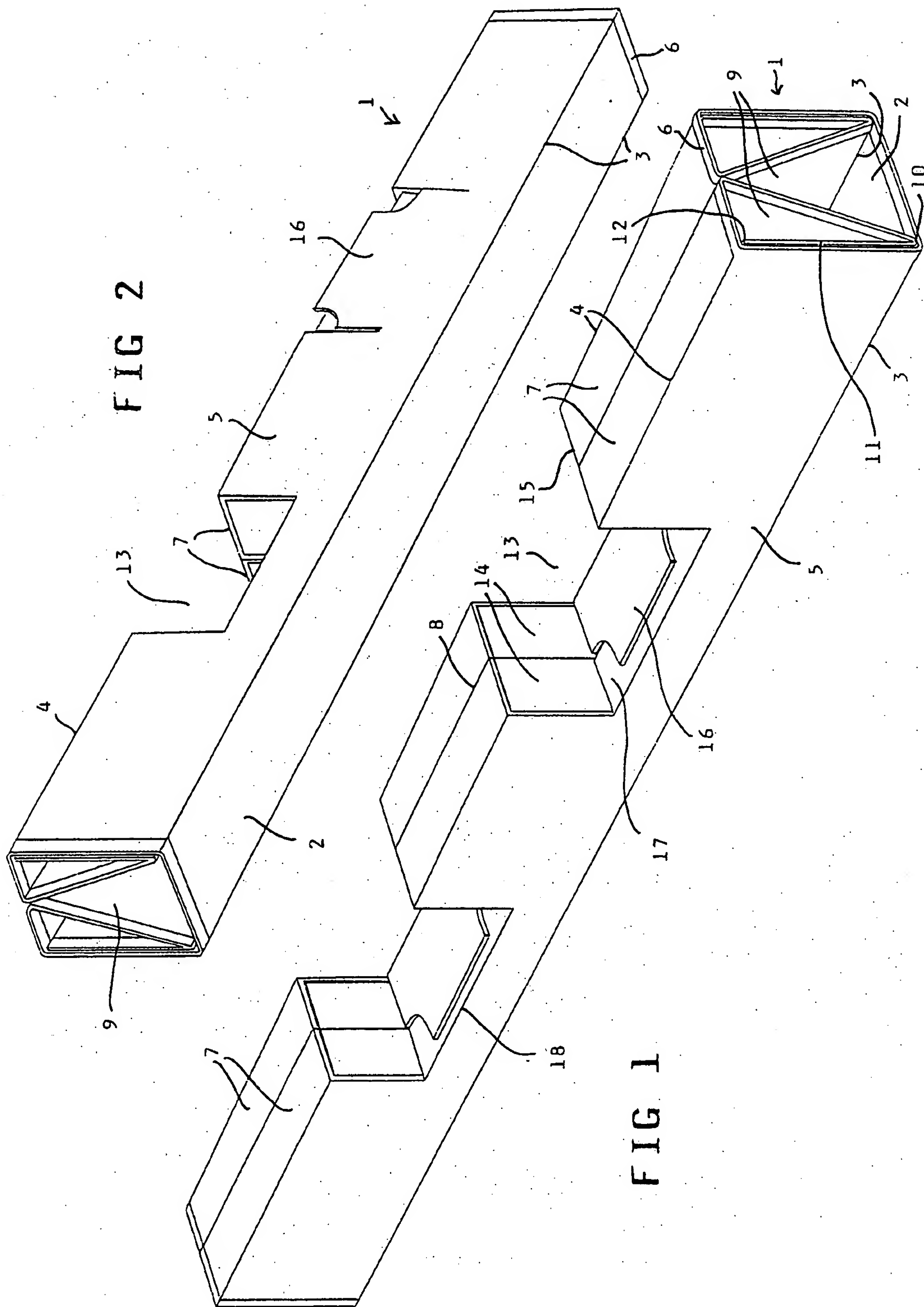
8. A pallet or the like according to any of claims 3-7, characterized in that the walls (5) in the area of the openings (13), which are laterally accessible, are provided with said flaps (16), which are connected to the leg blank along the longitudinal side (18), which faces the wall base or the leg base (2) and are bendable around perforations, grooves or the like, constituting this longitudinal side and in that the corners of the flaps preferably are provided with indentations (17), designed to facilitate and render possible respectively the flap folding and in that these flaps preferably extend into the area of the top surfaces (7) in order to obtain more space for the extension of the flaps in a direction transversal to the legs and/or in that the flaps (16) are designed solely on the one side, namely in the one closed opening (15) in the transversal direction of the leg.

9. A pallet according to claim 8, characterized in that the flaps (16) are retained as a part of the walls (5) and the support legs (11) respectively in order to exercise a carrying and pressure distribution function, in that, when a fork on a fork lift hits the flaps (16), these are de-

signed to be folded inwards, pulling the lateral protection flaps (14) with them, which are designed to close the lateral hollow space of the leg and reinforce the area around the opening, and in that a locking is designed to be accomplished through friction and/or a structural design, preferably because the closed openings (15) within the area of the brace legs (9) are somewhat wider, pushing aside the protection flaps (14) into a lateral space, somewhat expanded in this way and/or in that the longitudinal edge (19) of the opening, facing the longitudinal edge (18) of the flap, is provided with lateral oblique sections (20) obtained because the central part (21) is introduced into the closed opening (15) as a short and wide tongue, to which said section is connected in a step-like way, the protection flaps (14) and the large flaps (16) locking each other in the application position.

10. A method of producing a pallet according to any of claims 1-9, which pallet (25) comprises a tray (26) and legs (1), mounted under the tray, which legs (1) preferably are made of corrugated paper-board by folding a blank to obtain bottom and top surfaces (2 and 7 respectively) and walls (5) connecting said surfaces, brace and support means (9 and 11 respectively) also being obtained, designed to brace the legs and partially support a pallet load, c h a r a c t e - r i z e d in that the method is integrated into a packaging and/or loading or filling line, a tray (26) or a box or the like being fed and at the same time leg blanks being fed parallelly and in a lateral direction respectively, preferably at the same time applying a protective tape strip on the leg blank edges, which are designed to become leg ends, and in that the leg blanks subsequently are folded up to become legs (1), which then are fastened below the tray or the like in order to obtain a finished pallet, a container provided with legs or the like (25).

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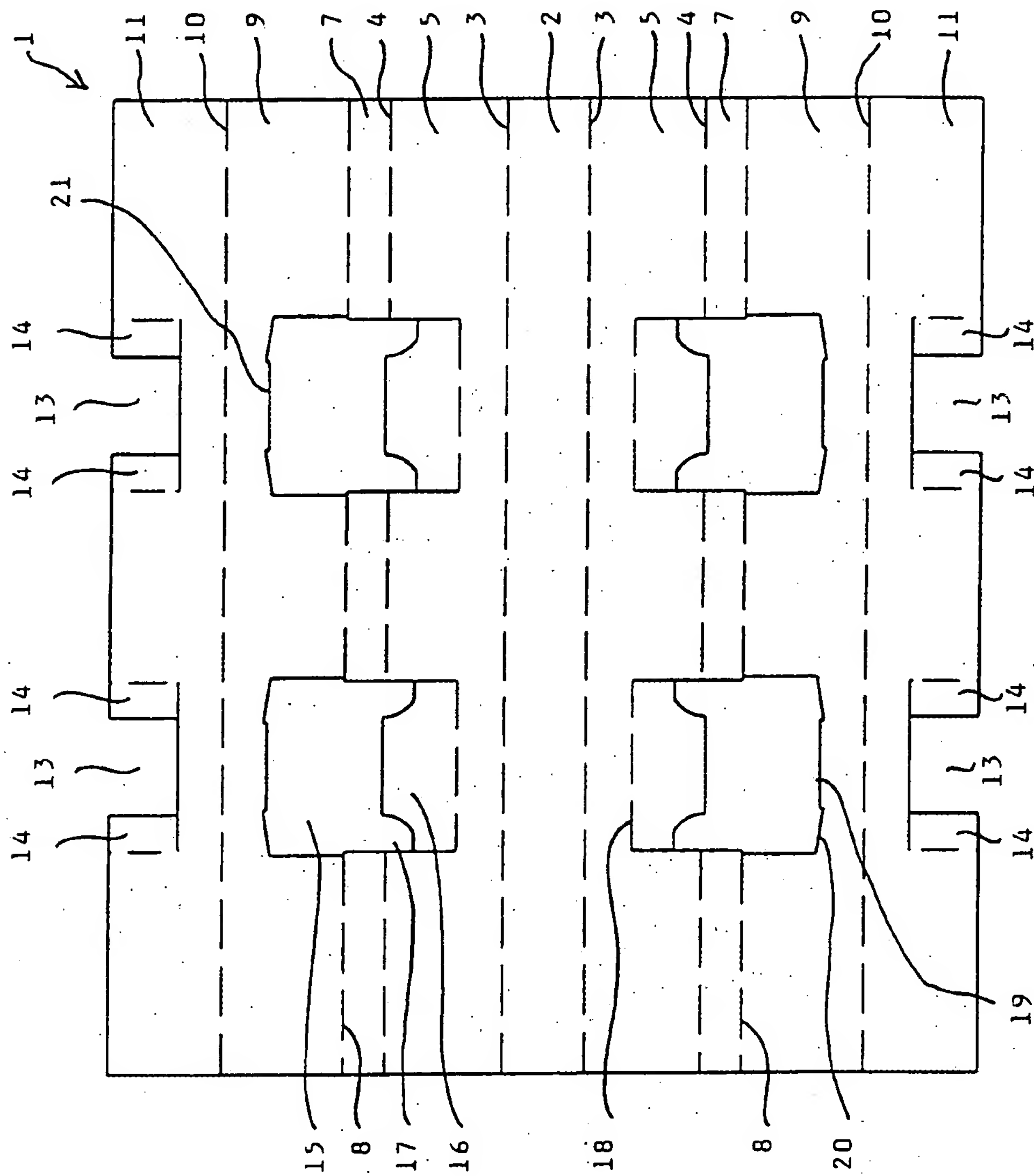
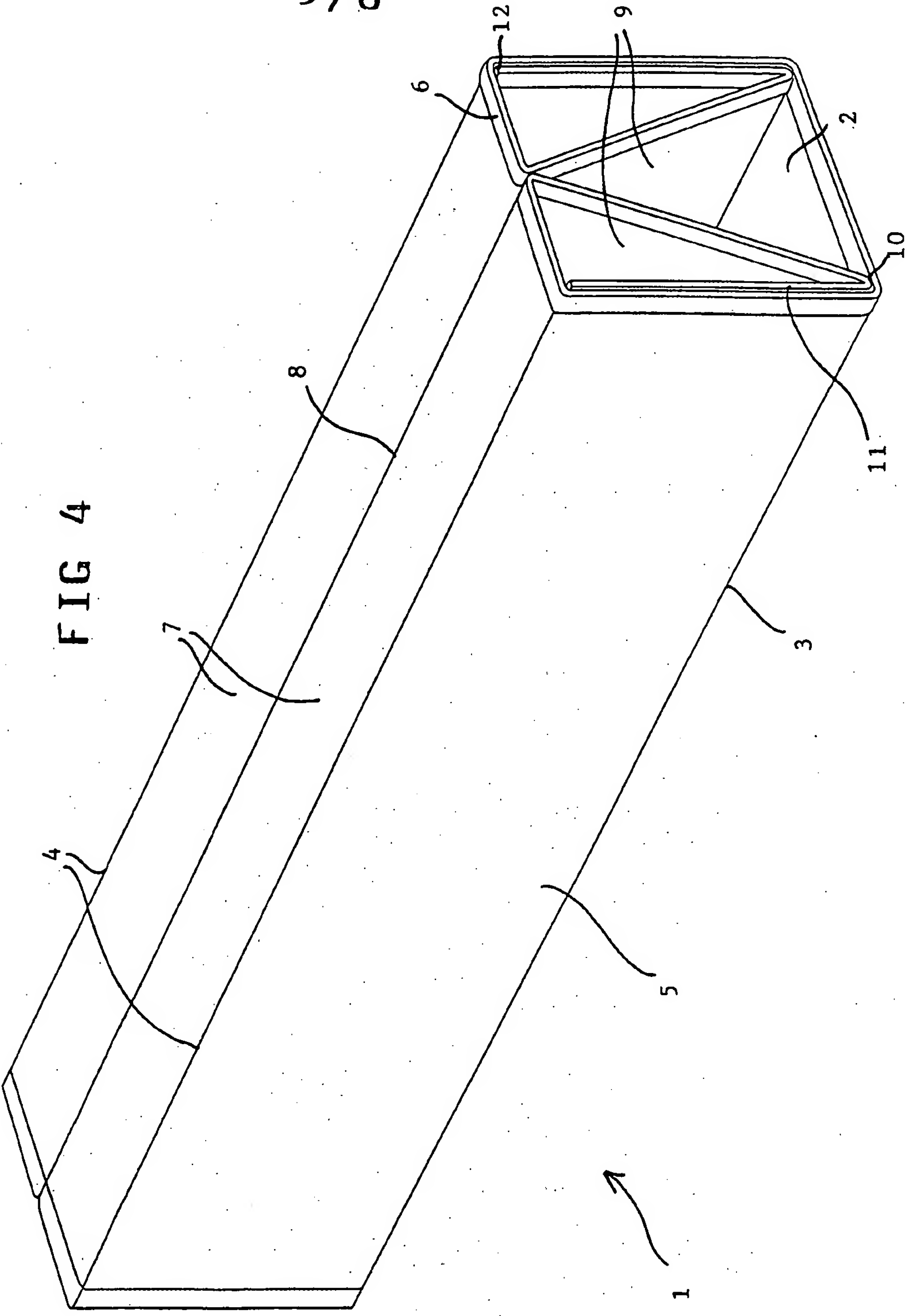


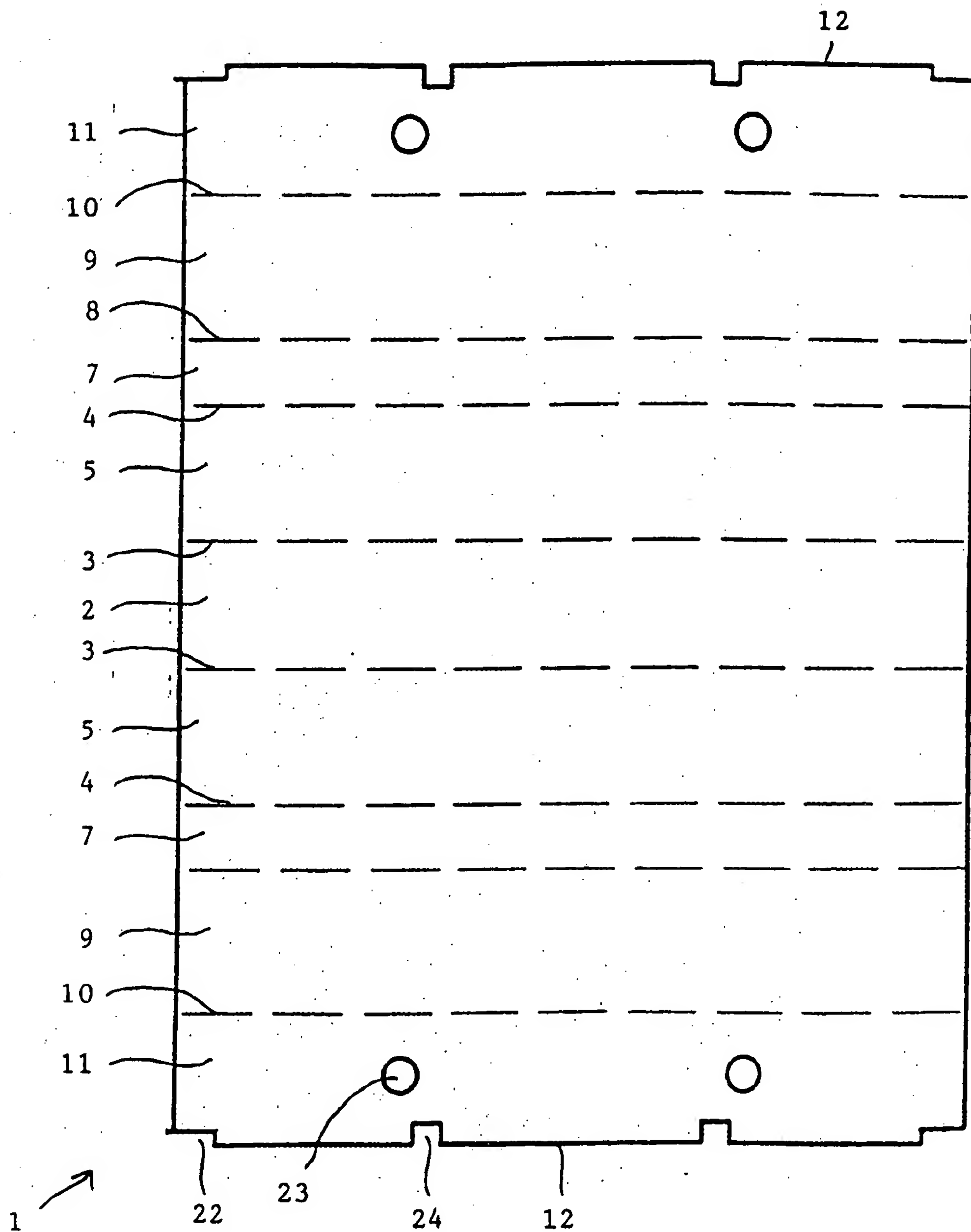
FIG 3

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4/6

FIG 5



5/6

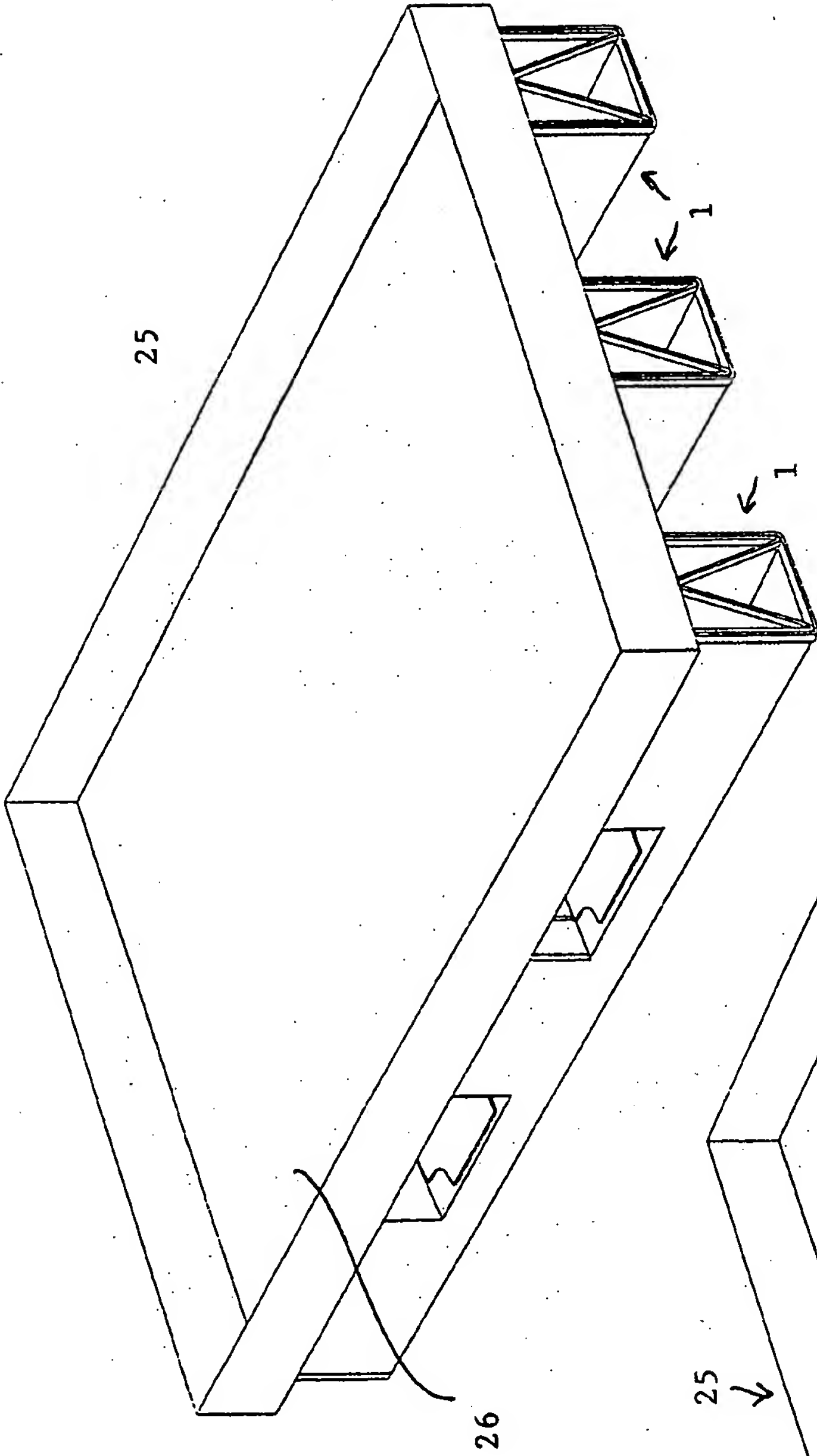


FIG 6

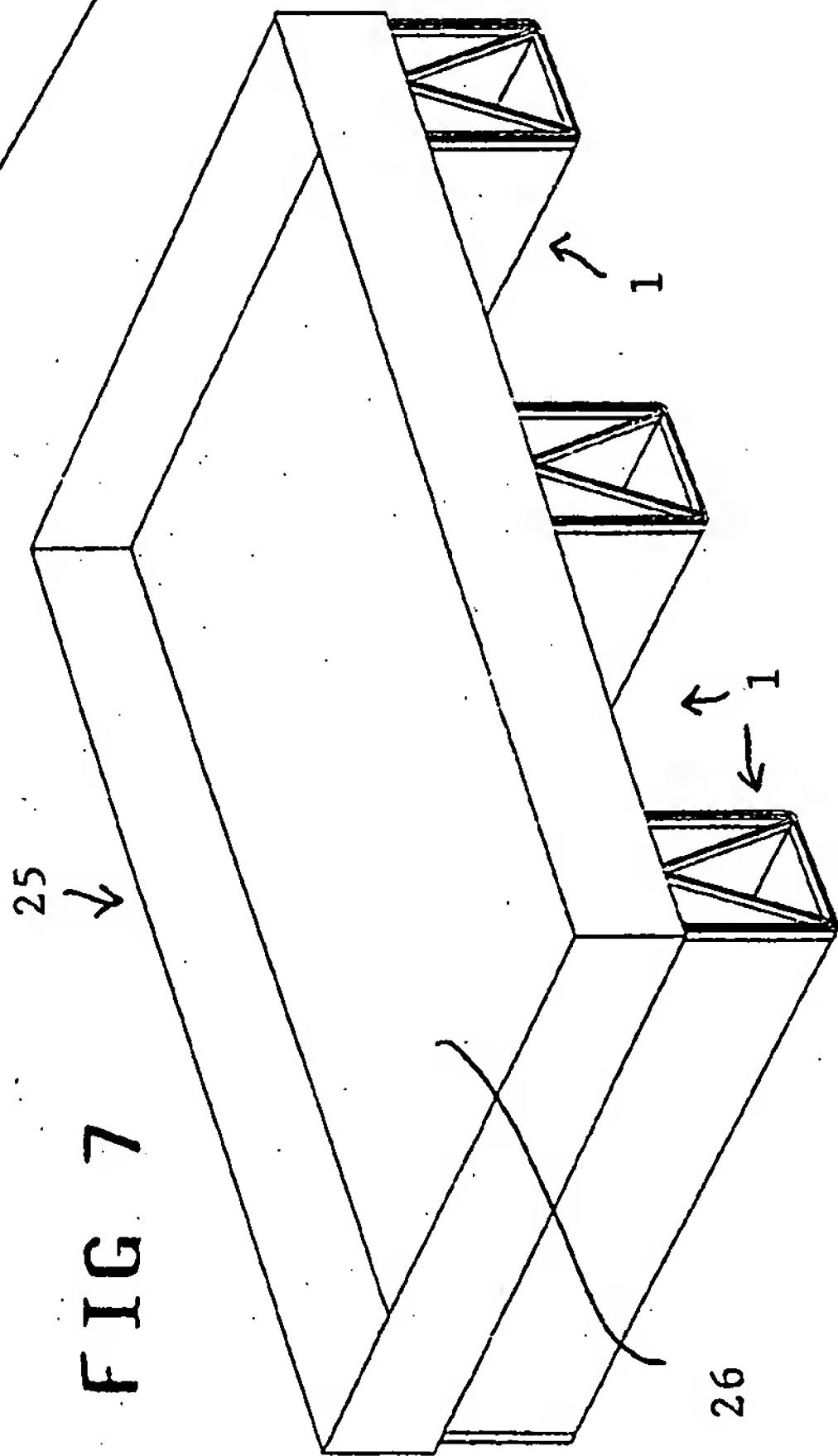
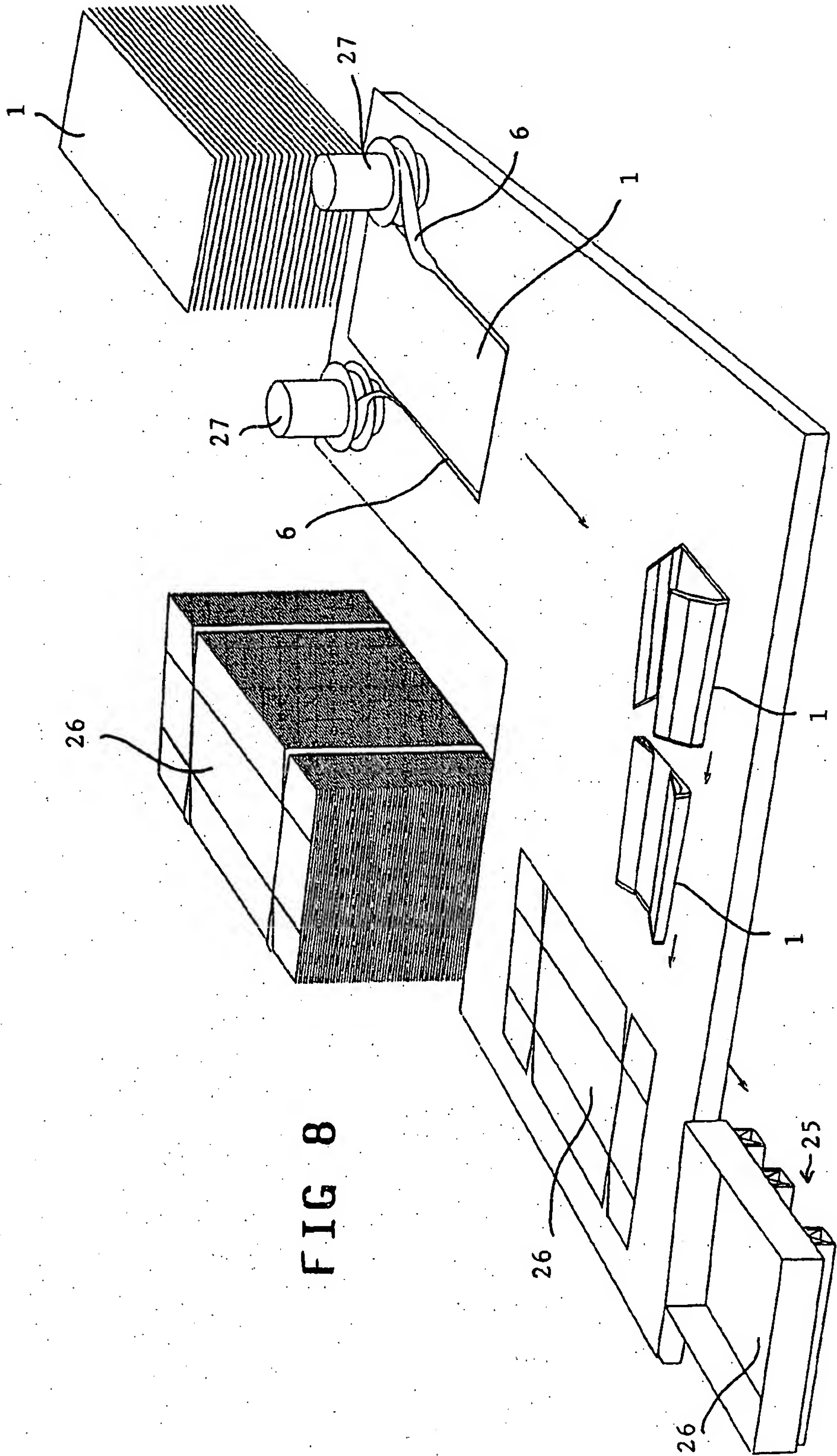


FIG 7

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INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 97/01767

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: B65D 19/34, B65D 19/40
According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: B65D

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPODOC

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	EP 0456961 A1 (GATE PALLET SYSTEMS, INC), 21 November 1991 (21.11.91) --	1-10
A	EP 0084906 A1 (FINSSEN S.P.A.), 3 August 1983 (03.08.83) --	1-10
A	WO 9518751 A (JEFFERSON SMURFIT CORPORATION), 13 July 1995 (13.07.95) --	1-10
A	US 5381739 A (KILPATRICK ET AL), 17 January 1995 (17.01.95) -- -----	1-10

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

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Date of the actual completion of the international search

11 February 1998

Date of mailing of the international search report

17 -02- 1998

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INTERNATIONAL SEARCH REPORT

Information on patent family members

03/02/98

International application No.

PCT/SE 97/01767

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